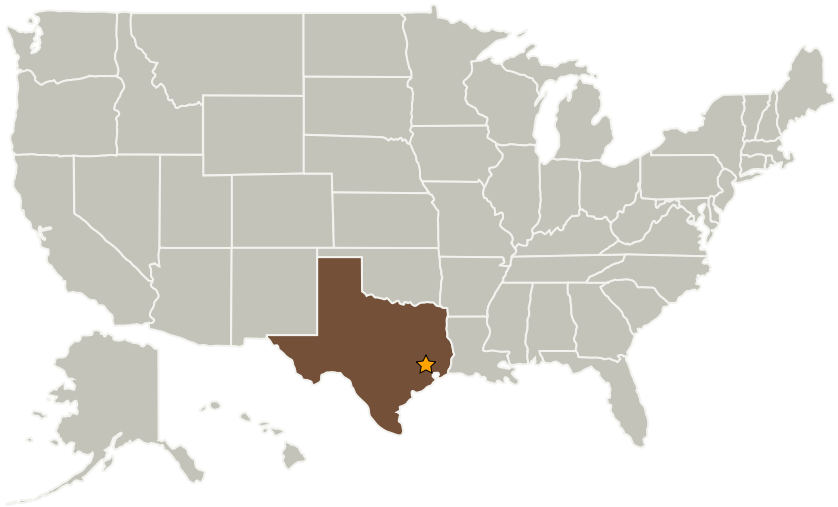
Handheld FRET-Aptamer Sensor for Bone Markers, Phase II

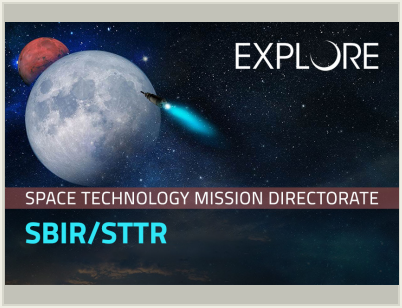
Completed Technology Project (2009 - 2011)

Project Introduction

Astronauts lose significant bone mass during lengthy spaceflights. Although, no effective treatments or prophylactics have yet been defined, it is important to monitor bone loss during missions. As such, the sensor must be compact and facile to operate in spacecraft. Operational Technologies Corp. (OpTech) proposes to complete development of its successful Phase I competitive fluorescence resonance energy transfer (FRET)-aptamer assays for several bone loss markers and calcidiol. In Phase I, OpTech developed several rapid (15 minutes) specific competitive polyclonal FRET-aptamer assays with low nanogram/ml sensitivity. OpTech also cloned and sequenced 110 bone marker and calcidiol aptamers which will be individually screened in Phase II for optimal FRET assay performance. During Phase II, OpTech will shift its FRET to emit in the red (> 600 nm) to avoid the intrinsic fluorescence of urine and serum. OpTech will also lyophilize and package optimized FRET-aptamer assays for use with a bubble-free plastic cuvette and body fluid collection system. The assay system will be coupled to a modified version of the commercial off-the-shelf (COTS) Picofluor[TM] handheld battery-operated fluorometer customized to detect bone markers and calcidiol in body fluids. OpTech will deliver the packaged assays, handheld reader and software to NASA for testing.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Operational Technologies Corporation	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB), Veteran-Owned Small Business (VOSB)	San Antonio, Texas

Primary U.S. Work Locations
Texas

Project Transitions

February 2009: Project Start

February 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.1 Aeroassist and Atmospheric Entry
    - TX09.1.1 Thermal Protection Systems